

whole looks like from a slice." Bromberg said that when the model is further advanced, it will offer his center, and others, chances to collaborate. "We work to understand how human cells react to toxicity. That's an important piece of the picture of lung function we all are trying to reach."

Contaminants in Fish

From the icy waters of Boston Harbor to the warm waves of San Diego Bay, bottom-dwelling fish suffer liver damage caused by chemical contaminants, according to researchers at the National Oceanic and Atmospheric Administration.

But seafood lovers need not panic, because damaged specimens were captured primarily in urban waters where commercial fishing is prohibited, said Lyndal L. Johnson of NOAA's Northwest Fisheries Science Center in Seattle, Washington.

"This is not a situation where the general public needs to be really worried about the fish they buy in the supermarket," Johnson said, adding that most people don't eat fish livers anyway. "But I wouldn't go out and catch bottom fish in contaminated parts of Boston Harbor and eat them."

In a study of winter flounder collected from 22 sites along the Northeast Coast, Johnson found that liver damage was "significantly elevated" in fish from contaminated urban waters such as Boston Harbor, Massachusetts, and Raritan Bay, New York. Biological damage was attributed to polycyclic aromatic hydrocarbons (PAHs), DDT, and chlordanes. Yet, polychlorinated biphenyls (PCBs) were "not significant risk factors for any of the lesions observed," Johnson wrote in the December 1993 issue of *Environmental Science & Technology*. Oil street runoff and industrial processes add PAHs to urban waters. DDT, chlordanes, and other ecologically persistent pesticides remain in water despite bans and restrictions on their use.

Older fish are most likely to be affected by such contaminants, Johnson said. Female specimens captured during the spawning season seemed less vulnerable to contaminants, but Johnson cautioned that this finding has not yet been confirmed. (Spawning fish may have migrated to urban bays from less contaminated waters.)

A second NOAA study prepared by Johnson's colleague Mark S. Myers revealed that English sole, starry flounder, and white croaker captured from 27 sites along the West Coast, from Alaska to southern California, were also affected by chemical contaminants. Liver damage and cancers were prevalent in fish collected from urban waters surrounding Los Angeles, as well as Puget Sound, San Francisco Bay, and San

Diego Bay, Myers reported in the February 1994 issue of *EHP*. Lesions were linked to PAHs, DDT, and its derivatives, chlordanes, dieldrin (an insecticide), aromatic hydrocarbons, and PCBs. Like Johnson, Myers detected more liver damage in older fish. Yet, he reported that gender of fish was not a consistent risk factor.

Faced with conflicting information on PCBs, Johnson and Myers can only speculate that these contaminants may work with other chemicals to promote liver damage. "What we think might be happening is that the primary carcinogens, the ones that cause DNA damage or mutations, are the PAHs, while the PCBs are promoters," Johnson said. "Once DNA damage or mutagenic effects have occurred, PCBs may promote the growth of those damaged cells." Chlordane and aromatic hydrocarbons may also require further study. Johnson linked an abnormality known as "hydropic vacuolation" with exposure to PAHs and chlordane. But in previous research by M.J. Moore of the Woods Hole Oceanographic Institute, winter flounder exhibited no such response to these contaminants. Yet, Moore supports the NOAA findings and says his "exposure protocol" probably didn't reflect natural conditions. "I would not interpret negative results to confound the good statistical work" of the NOAA team, Moore said.

While researchers continue to investigate the biological effects of various contaminants, consumers should simply avoid eating fish livers, said Chester Zawacki of New York's Department of Environmental Conservation. "The liver is an organ that has been referred to jokingly as the oil filter of the body," he noted. Because pollutants accumulate in fatty tissues, heavily fattened fish such as striped bass are most vulnerable

to contamination. "Winter flounder, cod, and other low-fat fish generally show very little contamination of their edible tissues," Zawacki said.

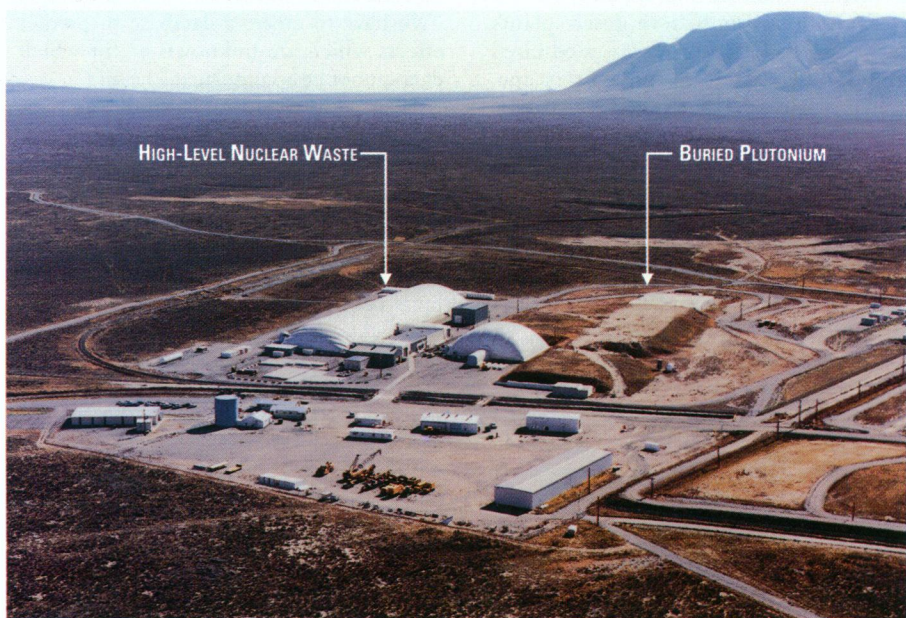
While the verdict may be out on the effects of eating contaminated fish, the Department of Health and Human Services has moved to err on the side of caution. On January 21, Secretary Donna Shalala announced new rules for seafood handling that will require seafood processors to prove that their seafood has not been exposed to unacceptable levels of water pollution such as bacterial contamination or toxins. The new system of controls, known as Hazard Analysis Critical Control Points, will take effect a year from the end of a 90-day public comment period.

Plutonium Problems

The Department of Energy's recent discovery of approximately 1900 pounds of plutonium in a dump at the Idaho National Engineering Laboratory (INEL) underscores concerns about the impact of nuclear facilities on surrounding communities.

In December 1993, the Department of Energy estimated that between 1320 and 1980 pounds of plutonium waste were sent to INEL from the Rocky Flats nuclear weapons plant near Denver, in addition to 807 pounds that DOE previously said had been shipped to Idaho. The wastes are buried in a landfill that sits atop a widely used aquifer.

Idaho officials do not yet know whether the additional wastes increase health risks to area residents, according to Terry Smith, spokesman for the state's INEL monitoring program, though no plutonium has been found in the aquifer, he said.



Striking plutonium. DOE recently discovered 1900 pounds of plutonium buried in a dump in Idaho.

DOE/Idaho